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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/030,118	01/24/2002	Byunghong Kim	KIMB3005/REF	6842
23364	7590	01/07/2005	EXAMINER	
BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314			PRATS, FRANCISCO CHANDLER	
			ART UNIT	PAPER NUMBER
			1651	

DATE MAILED: 01/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/030,118

**Applicant(s)**

KIM ET AL.

**Examiner**

Francisco C. Prats

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 October 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 10-22-04.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

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**DETAILED ACTION**

The amendment filed October 22, 2004, has been received and entered. The text of those sections of Title 35, U.S. Code, not included in this action can be found in a prior office action.

Claims 1-7 are pending and are examined on the merits.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3, 6 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, the recitation "enrichment culturing" renders the claims as amended indefinite because the term "enrichment" is a relative term, whose metes and bounds are unclear. More specifically, it is not clear what the basis for comparison is, such that one can determine whether a particular culture is considered enriched or not. Moreover, any microbial culture is by definition enriched, since it contains more of the cultured organism than any other. It is therefore confusing how the term

"enrichment" can possibly differentiate one culture from another. A holding of indefiniteness is therefore required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-5 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim et al (EP 0 827 229 A2).

Kim discloses a mediator-less (see title) biofuel cell comprising anodic and cathodic compartments separated by a cation exchange membrane. See Fig. 2; see also page 5, lines 6-9. The apparatus contains an ammeter, which itself contains an electric current detecting unit and a current measuring unit, and can also contain a recording unit. See page 5, lines 31-33. In operation, the electrochemically active bacteria are loaded into the anodic chamber under anaerobic conditions. See, e.g., Examples 2, 6 and 7. Because the apparatus of Kim contains all of the structural attributes required in the claims under examination, a holding of anticipation is required. Thus,

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although Kim does not mention using the apparatus as a BOD measuring unit as recited in claim 1 under examination, the apparatus clearly can be so used, as evidenced by the fact that the apparatus possesses all the components recited in the claims.

With respect to method claims 3, 5 and 7, those claims are considered to be met because all claimed process steps are in fact described by Kim. Specifically, in each of Examples 2 and 6-8, Kim introduces an organic-containing sample into an apparatus meeting all of the claimed structural limitations, under nitrogen-induced anaerobic conditions, cultures the microorganisms, and measures the current generated by that culture in response to introduction of the organic compounds. The requirement for a "dense" culture is considered to be met by Kim because the cell concentrations in the disclosed cultures can properly be considered "dense" in relation to less dense cultures. Because all process steps required in applicant's claims are described in the reference, a holding of anticipation is required.

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al (EP 0 827 229 A2).

As discussed above, Kim discloses a mediator-less biofuel cell comprising anodic and cathodic compartments separated by a cation exchange membrane, electrical current being generated by

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the apparatus by anaerobically culturing electrochemically active bacteria therein. Kim differs from the claims in not using a potentiostat in the embodiment described in Fig. 2, and the Examples using that apparatus. However, Kim clearly suggests the utility of a potentiostat in the disclosed apparatus. See page 7, lines 10-14. Thus, the artisan of ordinary skill practicing the invention of Kim clearly would have recognized the utility of a potentiostat in the apparatus depicted in Fig. 2, and would therefore have been motivated to have included that control in the apparatus of Fig. 2.

Because Kim does not measure absolute values for BOD or absolute concentrations of organic compounds, one may also view Kim as failing to disclose measurements of those values, despite the fact that all process steps required in applicant's claims are described in the reference. However, one of ordinary skill viewing the Kim patent clearly would have recognized that the current generated by the culture was a direct function of the concentration of the organic compounds within the culture, and would have considered the measurement the concentration of organic substances and/or of BOD (itself a function of the concentration of organic substances) an obvious matter of comparing the amount of current generated by known concentrations of organic compounds to the amount of current

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generated by samples containing unknown concentrations of organic substances.

Kim also differs from the claims in failing to disclose the use of active sludge and wastewater as a current-generating bacterial culture in the apparatus. However, Kim clearly discloses that those materials are suitable sources of anaerobic bacteria suitable for use in the apparatus. See page 6, at lines 2-29. Thus, recognizing from Kim that sludge and wastewater contain microorganisms capable of generating electrical current when used in the apparatus disclosed in Kim, in particular in Fig. 2, the artisan of ordinary skill would have been motivated to have used those materials as current-generating materials according to Kim's disclosure. Additional motivation would have been derived from the fact that using the source material directly would have saved the cost, time and effort to perform the steps required to prepare the homogeneous organism cultures prepared by Kim. A holding of obviousness is therefore required.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple



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assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claim 6 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over the claims of copending Application No. 10/030,153. Although the conflicting claims are not identical, they are not patentably distinct from each other because, like the claims in the copending application, the claims under examination recite the culturing of sludge and/or wastewater in in a biofuel cell so as to generate and electrical current.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

#### ***Response to Arguments***

All of applicant's argument regarding the pending grounds of rejection has been fully considered but is not persuasive of error. While applicant urges that the term "enrichment culture"

is a known term in the art, applicant fails to provide any evidence in support of this assertion, such as a textbook citation. Moreover, while applicant appears to assert that the term is defined in the specification at page 9, it is unclear how the disclosure at page 9 defines the term. While page 9 of the specification describes the fact that the disclosed invention allows preferential culture of one microorganism over another, page 9 of the specification does not contain any definition of the term "enrichment." Rejection under § 112, second paragraph, is clearly required.

Applicant urges that the art rejections over Kim et al are improper because Kim does not use an enrichment culture method wherein certain favored microorganisms are allowed to grow preferentially over certain other microorganisms. However, it is unclear how this argument differentiates the claims under examination from the prior art. Specifically, each of the elements required in apparatus claims 1 and 4 is disclosed as being present in the apparatus of Kim. Similarly each of the process steps recited in the process claims 3, 5 and 7 is disclosed in the Kim reference. Moreover, to the extent that the "enrichment" culture is recited in anticipated claims 3 and 7, note specifically that any microbial culture would have a predominant microorganism, and therefore would be considered

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enriched. Further still, to the extent that applicant asserts that the claimed devices and processes allow for control of microbial growth, no such step is recited in any of the claims.

Still further, applicant urges that the prior art's use of the anode as an electron sink is distinguished from the claimed use of the anode as an electron acceptor allowing for microbial enrichment after a predetermined time, and that the prior art anode arrangement allows for only one day of microbial activity as opposed to the 6 months of activity provided by the claimed apparatus, and that it is impossible as a practical matter to determine the amount of organic materials using a fuel cell with only a one to two day service life, whereas the 6 month operability of the claimed device allows for BOD determination.

However, not one of these limitations is recited in the claims. Moreover, applicant does not point to any facts or evidence in support of the assertions regarding the shortcomings the prior art. Rather, on the current record, the two apparatuses both have anodes, which is simply a negatively charged electrode. The claims and prior art do not differ in this regard. Thus, if a certain result occurs when using the prior art device, the same result must necessarily occur when using the claimed device. If there is some difference, that difference is due to some aspect of applicant's invention which

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is not recited in the claims. In short, applicant's argument urges patentability based on numerous features which are simply not recited in the claims.

With respect to the issue of obviousness-type double patenting, applicant urges that the claimed devices are distinguishable based on differences in bacterial growth and areaobic versus anaerobic behavior, this analysis is not borne out when the claims are actually compared. Because the claims recite the essentially the same steps, using only slightly different wording, it is clear that a terminal disclaimer is required. The differences urged by applicant simply do not appear in the claims.

In sum, applicant's arguments urge patentability based on features which are simply not recited in the claims. The rejections of record must therefore be maintained.

No claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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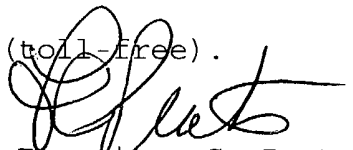
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Francisco C. Prats whose telephone number is 571-272-0921. The examiner can normally be reached on Monday through Friday, with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael G. Wityshyn can be reached on 571-272-0926. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Francisco C. Prats  
Primary Examiner  
Art Unit 1651

FCP